Mecheleciv

Volume 22 March - 1964 No. 4

THE QUEEN

THE GEORGE WASHINGTON UNIVERSITY

ONLY FORD-BUILT CARS MEET THE CHALLENGE WITH TOTAL PERFORMANCE!

Something wonderful's happened to Ford Motor Company cars! Under the freshest styling seen in years, there's a new kind of durability and vigor that more than meets the demands of today's and tomorrow's high-speed turnpike driving conditions.

What's the secret? Quality engineering for **total** performance. Quality engineering so outstanding that Ford Motor Company received the NASCAR Achievement Award for engineering excellence which "superbly combines the prime essentials of great automobiles—performance, reliability, durability, comfort and safety."

Total performance makes a world of difference. Bodies and frames are solid and quiet even on the roughest roads. The ride's so smooth, so even-keeled, it seems to straighten the curves and shorten the miles. And nothing matches the spirit, sparkle and stamina of advanced Ford-built V-8's and thrifty Sixes. Total performance is yours to enjoy in all our 1964 cars—from the frisky Falcon to the matchless Lincoln Continental.

Ford

MOTOR COMPANY

The American Road, Dearborn, Michigan

WHERE ENGINEERING LEADERSHIP BRINGS YOU BETTER-BUILT CARS

B-52. 8-engine jet bomber with range of over 9000 miles. Backbone of the Strategic Air Command.

Are you ready for a multi-million-dollar responsibility?

If you are, there's a place for you on the Aerospace Team—the U. S. Air Force.

No organization in the world gives young people a greater opportunity to do vital, responsible work.

For example, just a short while ago a 23-year-old Air Force lieutenant made a startling breakthrough in metallurgy. And a recent All-America tackle is doing advanced research in nuclear weapons.

If you have talent, you'll have a chance to show it in the Air Force. Your work can put you and your country ahead.

You can earn your commission at Air Force Officer Training School, a three-month course open to both men and women. To apply, you must be within 210 days of your degree.

For more information, contact the Professor of Air Science. If your campus has no AFROTC, see your Air Force recruiter.

U.S. Air Force

CONTROVERSY

"LETTERS TO THE EDITOR" has been a flourishing column in this magazine since its initiation.

However . . . . this issue finds us with but one lone opinion to ponder.

Nevertheless . . . . this opinion is well worth it.

Thursday
12 December 63

Dear Editor,

I found Mr. Jacobsen's article on pure and applied science very interesting. In the final paragraph he mentioned that emphasis must be placed on production and application "For a society to move forward." I think it is wise for us to consider just exactly what we are "moving forward" into. A list of the recent blessings of science must certainly include:

(1) Nuclear Warfare, or the ability to wipe out all civilization and most of humanity.

(2) Large amounts of radioactive dust released into the atmosphere by the testing of nuclear weapons.

(3) The pollution of the air we breathe and the water we drink by the noxious discharges of multitudinous industrial plants.

(4) A population explosion.

(5) The over-use of pesticides, thus upsetting the balance of nature in many parts of our country.

Considerations such as these make me very skeptical of the Prophets of Progress. Our situation reminds me of a Pyrrhic victory—a little more such progress and we shall be done for. Scientists are continually telling us that Utopia is just around the corner and the millennium will be dawning soon. I certainly hope it hurries, because at the rate we are going, there will soon be no one left to enjoy it.

Sincerely,

Lewis M. Campbell

Some formidable arguments.

Let us not lose sight, though, of the true advances made by our society. Example: Medicine and electronics, i.e., biomedical electronics, electrocardiograms detect malfunctions in the heart early enough to allow proper treatment (which, itself, is a product of our advanced society) before the disorder becomes fatal. X-ray equipment and electronic monitoring devices locate and cure certain susceptible types of cancer. Premature babies are kept alive in electro-mechanical incubators designed to monitor nearly every body function of these tiny members to tomorrow's society.

Surely man can, through sheer intellect, devise a means of shifting the delicate balance of good or bad toward the virtues which increased knowledge can procure.

--J. J. P.

Mechelociv

VOLUME 22 MARCH - 1964 No. 4

STOP!

LOOK!

LISTEN!

Published at the George Washington University by direction of the Engineers' Council. Published six times during the school year in October, November, December, March, April, and May. Second class postage paid at Washington, D. C. Address communications to Mechelociv Magazine, Davis-Hodgkins House, George Washington University, Washington 6, D. C., or telephone FEderal 8-0250, Ext. 528.

Subscription Price: Two Dollars

CHANGE OF ADDRESS: Send your new address at least 30 days before the date of the issue with which it is to take effect.

M. STANLEY HELM
Professor of Electrical Engineering
University of Illinois

WENDALL E. MILLER
Professor of Electrical Engineering
Associate Head of the Department
University of Illinois

WHY BE AN ENGINEERING TEACHER?

WHAT IS TEACHING?

Few people other than teachers actually realize just what is involved in teaching. It is much more than lecturing in the classroom or directing investigations in the laboratory. A sound knowledge of the course material is only the starting point. A true teacher tries to stimulate each student to learn for the sake of learning alone, not just because it is necessary to pass the course. At the same time a student is learning, he must be guided in such a manner that his ability to analyze or reason logically will be developed. A difficult and yet intriguing aspect of teaching is that of inspiring each student to extend himself as much as possible and thereby develop his self-confidence. Assignments must always cause a student to exert himself mentally and yet not be so far beyond his level of maturity as to impair his belief in his own ability to solve challenging problems.

Since students differ so much in personality and ability, the problems encountered by the teacher in stimulating, developing, and inspiring students are many-fold. Because of this it is difficult, if not impossible, for a dedicated teacher to "get into a rut". Instead, the teacher is always faced with challenging and stimulating problems.

Probably the most basic asset a teacher can have to meet the many challenges in teaching is a very strong desire to explain things to his students. To be effective, this should be done enthusiastically but balanced with considerable patience. Other valuable assets are a cheerful and optimistic view of life, a sense of humor but one which avoids sarcasm, a sincere interest in the problems of young people, an appreciation of the viewpoints of others, a strong sense of fairness, and a genuine affection for students.

SATISFACTION

There are certain intangible rewards or satisfactions in a teaching career. One of these results from serving mankind by training young people to take their places in our society. This is a very important contribution to the welfare of the nation, and the dedicated teacher feels the responsibility but revels in it. This gives a stimulation to the teacher which produces a definite satisfaction and happiness in his everyday work.

Another stimulating reward of being a teacher comes from the fact that most of the work is with young people. The teacher is exposed to the fresh viewpoints and enthusiasm which go hand-in-hand with youth. This, along with the basically optimistic and confident spirit of young people, provides the teacher with an exhilarating environment in which to work. It has been truly said that the way to stay young for a lifetime is to associate with young people.

A teacher has a definite feeling of accomplishment when he has explained a difficult point in such a manner that his students feel that they understand it. The greater the effort and the patience required of the teacher in doing this, the greater the satisfaction obtained by the teacher. There is also considerable satisfaction derived by a teacher as he watches the growth and development of a student or a class as they progress. This is particularly gratifying if the teacher feels that he is at least partly responsible for this development because of the way he guides, stimulates, inspires, and encourages his students.

A teacher experiences a warm sense of satisfaction and pride when a former student becomes successful in his career and in civic life. Teaching becomes the most worthwhile of all endeavors when a former student returns and expresses his appreciation for the help, guidance, and encouragement he received from his teacher while in school preparing to take his place as a useful member of society.

BONUS BENEFITS

There are many advantages and rewards in teaching which might be referred to as bonus benefits since they are not usually attainable in any other profession. In this category is the extraordinary opportunity for the teacher to expand his knowledge and understanding of the technical world. All engineers and scientists have a desire, not merely to keep in touch with, but also to participate in the latest discoveries of our rapidly developing technology and our quest for basic scientific knowledge. The engineering teacher must necessarily possess a large measure of this desire for greater knowledge and he finds an excellent opportunity to satisfy these aspirations by his studies in connection with the preparation and improvement of classroom material. Many teachers of technical subjects occasionally request changes in their teaching

--Continued on Page 6

Our gasoline isn't good enough for some people...us

We like to think that American Oil products are the best you can buy. And they are. We also like to think we can improve the quality of our products without increasing the cost to the consumer. And we do. Consistently.

A considerable amount of work is done in testing catalysts and searching for those which will help produce the types of gasoline our customers want at the price they can afford.

One of the people engaged in the research and development of our manufacturing processes is John Mitchell, 24, a graduate Chemical Engineer from the University of Texas.

The opportunities for bright young scientists like John Mitchell are virtually unlimited at American Oil. American Oil offers a wide range of new research opportunities for: Chemists—analytical, electrochemical, physical, and organic; Engineers—chemical, mechanical, and metallurgical; Masters in Business Administration with an engineering (preferably chemical) or science background; Mathematicians; Physicists.

For complete information about interesting careers in the Research and Development Department, write: J. H. Strange, American Oil Company, P. O. Box 431, Whiting, Indiana.

IN ADDITION TO FAR-REACHING PROGRAMS INVOLVING FUELS, LUBRICANTS AND PETROCHEMICALS, AMERICAN OIL AND ITS AFFILIATE, AMOCO CHEMICALS, ARE ENGAGED IN SUCH DIVERSIFIED RESEARCH AND DEVELOPMENT PROJECTS AS:

Organic ions under electron impact • Radiation-induced reactions • Physiochemical nature of catalysts • Fuel cells • Novel separations by gas chromatography • Application of computers to complex technical problems • Synthesis and potential applications for aromatic acids • Combustion phenomena • Design and economics: new uses for present products, new products, new processes • Corrosion mechanisms • Development of new types of surface coatings.

AMERICAN

AMERICAN OIL COMPANY

assignments in order that they may broaden and extend their scope of information. Actually, one never fully understands an advanced technical subject until he teaches it several times, and through this thoroughness of understanding comes a feeling of accomplishment.

To further satisfy his quest for knowledge, the engineering teacher is given every encouragement to conduct basic research in his area of specialization, and thereby contribute to the frontier of scientific understanding. Laboratory space and facilities are usually provided by the educational institution, and financial assistance can usually be obtained from industrial or governmental agencies. Through publications in technical journals, talks before technical audiences, and collaboration and informal discussions with fellow scholars, the stature of the engineering teacher is enhanced to the fullest extent.

Industrial consultation is another means by which the engineering teacher can broaden his scientific knowledge as well as increase his income. Opportunities are available for consulting in industry during vacation periods and on a part time basis during the school year. The engineering teacher can thus obtain an excellent panorama of the industrial world and can make a real contribution through collaboration with his colleagues in many areas of industry.

The engineering teacher is indeed fortunate to have the traditional school vacation periods for professional development. Quite often it is necessary to use the shorter vacation periods for study and preparation related to the classroom, but during the summer months a choice of activities is possible; for example, industrial consultation, teaching either at home or at another institution, working on research at his home institution or in industry, or writing textbooks and technical articles. In addition, most educational institutions grant salaried sabbatical leaves of absence for periods of six months to one year, during which time the teacher may further increase his scientific knowledge by extended travel, study, or writing.

The large degree of self-direction which exists in the teaching profession is a most valuable attribute. No man in modern society is so nearly his own boss. The teacher is permitted to choose the technical area in which he wishes to specialize; he is allowed to select his class material, his research equipment, and to direct his classes and research laboratory in the manner he believes most appropriate. He does not punch a time clock, but there is much work to do. He has classes to meet, and associated commitments to fulfill, but so long as the job is completed on schedule, he is free to choose his working hours. This freedom from restrictions usually means that the working day for the teacher extends well beyond eight hours. However, the privilege of being able to perform a self-directed task adds a great deal of enthusiasm to the hours involved.

The enjoyment and the inspiration derived from living in a college town is another worthwhile benefit often experienced by the engineering teacher. Many universities are located in medium-sized towns in which the educational and athletic functions of the university form the nucleus of the community. The satisfaction derived from raising one's family in a cultural atmosphere is certainly a benefit of great magnitude.

Necessities

Just as in all other lines of endeavor, inevitably there are some tasks in teaching which many teachers consider unpleasant and they should be recognized. A number of these tasks are involved in evaluating a student's performance in a course. Papers, reports, quizzes, and examinations must be carefully scrutinized and graded if they are to contribute to a student's learning. Determination of a student's final grade in a course is a disagreeable job, particularly if it becomes necessary to fail the student. At such times the teacher often wonders if he himself has failed somewhere in his teaching.

Student counseling, registration duties, some, but not all, committee meetings, activities in professional societies and other jobs which are a part of administering an educational program often involve routine. All require considerable time. However, many of these tasks help the teacher to know his students and his profession better and usually result in his being able to do a better job of teaching.

CONCLUSIONS

In teaching there are many challenges and rewards which make teaching a stimulating, fascinating, and exciting career. An excellent recommendation for teaching as a career is that the dedicated teacher does not look upon teaching as only a job but as THE JOB.

NOTE: If the reader would like more information on teaching as a career, please write:

Professor W. Leighton Collins, Executive Secretary
American Society for Engineering Education
University of Illinois
Urbana, Illinois

for the following booklets:

"Teaching Tomorrow's Engineers" (free)
"Engineering Enrollment and Faculty Requirements 1957-1967" (25 cents)
"Salaries and Incomes of Engineering Teachers" (25 cents)

SPOTLIGHT

Professor Braun

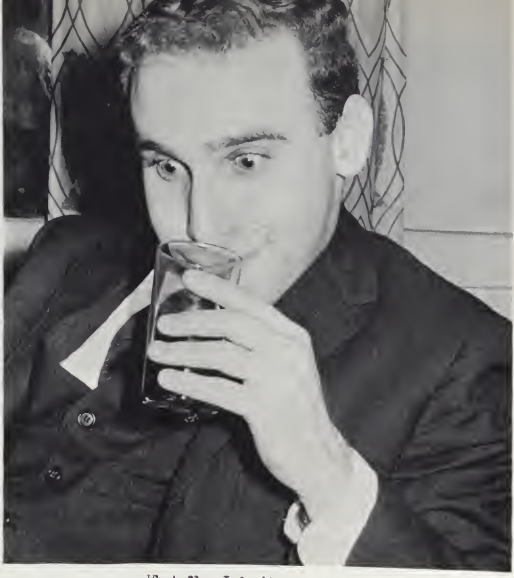
Professor Edward H. Braun, AB and AM (Physics) from Columbia University, instructor at University of Virginia, American University, and presently at The George Washington University School of Engineering and Applied Science — an outstanding example of the (nearly) perfect teacher.

Professor Braun joined the G.W.U. staff in February of 1961 as a teacher in electrical engineering (using the old curriculum terminology). At the present time, he is spending his leisure hours writing two books: one on physical electronics, one on electromagnetic wave theory. He also manages some private, independent research in the fields of electromagnetics and electrodynamics.

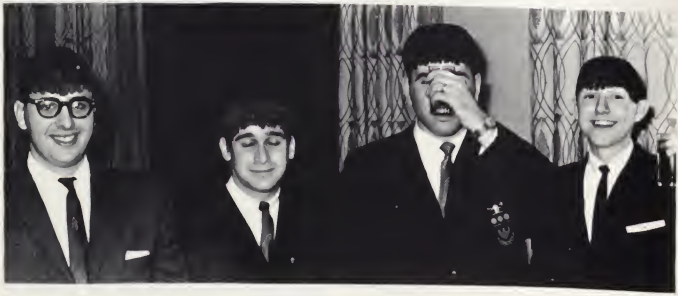
His philosophy of teaching is to present an overall logical view of the subject material. Braun (as he is called by those fortunate enough to have had him for a course) tries to cover the fundamentals of the subject, and gets into enough application so that the student, if so stimulated, can read further on his own and be able to understand more complex material.

To the dismay of most undergraduates who have had him for one course, or who have heard about his classes, Professor Braun teaches primarily graduate courses. He enjoys teaching in fields that are still in the research stages. To fully cover such subjects, he presents new material from technical articles pertinent to the field. With him, a text is supplemental, but not required. As a matter of fact, his lecture notes are enough to comprise an excellent text in themselves.

His methods of teaching seems to be highly regarded among the students, both graduate and undergraduate, as every semester more people sign up for his courses than can be accepted. Other professors hold him in equal esteem: they have been quoted as saying that he is one of the finest teachers they have seen. Professor Braun has proven himself a most valuable asset to the School of Engineering.



What fly, I don't see no fly...



Hee, Hee... Hummmmmmmmm... Glurg! Yeah!

"THE TRIALS AND TRIBULATIONS

OF HAVING FUN"

by Tom McIntosh

During the week of February 17, in conjunction with National Engineers' Week, the doors of the School of Engineering and Applied Science of The George Washington University were thrown open to hundreds of junior and senior high school students and to the general public within an area described by a radius of 50 miles from Washington. The response was excellent.

Approximately 50 different letters inviting various companies and organizations to participate in this year's Open House were sent out at the beginning of September, 1963. From these, the organizations listed below returned a favorable reply. After each favorable reply was received, an average of 2 letters or 3 telephone calls per company were needed before an exhibit could finally be set up. This seemingly large amount of work was, in reality, quite small when spread out over the 4 or 5 months available between the time of initial contact and final preparations. The only apparent difficulty encountered was that more than one individual was needed to supply answers to the many questions that arose.

SOME ODDS!

Some 17 exhibits were displayed by governmental and private agencies in and around Washington, with entries being shipped from Rochester, New York, Pittsburgh, and Bethlehem, Pennsylvania. Among the exhibitors were:

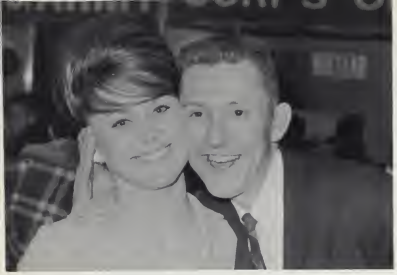
U. S. Steel
Eastman Kodak
National Bureau of Standards
U. S. Navy
Army Medical Service
U. S. Army Corps of Engineers, Ft. Belvoir, Va.
Office of the Chief of Army Engineers
Naval Ordnance Laboratory
Bethlehem Steel
Bureau of Public Roads
Bureau of Yards and Docks
NASA
Bureau of Ships
David Taylor Model Basin

PEOPLE, PEOPLE, EVERYWHERE . . .

The smallest estimates approximate the number of visitors to be around 1000 men, women, boys, and girls. The visitors came from as far as Charlottesville, Va., and Baltimore, Md., with the largest single group of visiting students consisting of 275 students from W. T. Woodson High School in Fairfax, Va. The large turn-out provided a number of very interesting situations. If anyone was in the School of Engineering and Applied Science on the morning of Friday, February 21, they will never forget the almost impossible task of just trying to cross a hall or go up or down a flight of stairs. There were some 500 visitors in the building at one time. People were everywhere! Many problems developed and some tempers may have been lost, but, being good engineers, the difficulty was soon relieved. A great deal of credit must be given those few over-worked, and underpaid, individuals who were so gracious as to volunteer their services on Thursday and Friday of that week.

TO ENGINEERS . . .

The real value of a program of this type may never really be known, but if only one or two eligible students realize a true interest in engineering, the show can be called a success. From conversations with the visiting students, all seemed quite interested in G.W.U., and were especially pleased with the student demonstrations, which consisted of 8 to 10 Electrical Engineering experiments, 3 Mechanical Engineering experiments, and a demonstration of the Materials Laboratory by the student chapter of the ASCE. These exhibits proved, far more dramatically than any others, that engineering is a growing field, open to new people schooled in the art of . . . . engineering.

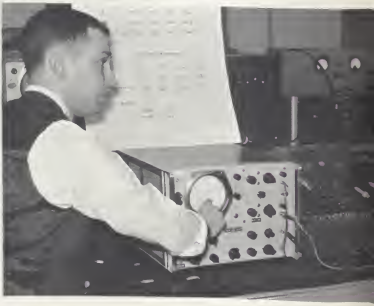


"See you at the Week . . . . . .

Then you put your foot here, see; then, when this thing rolls away, you grab here, see; then...

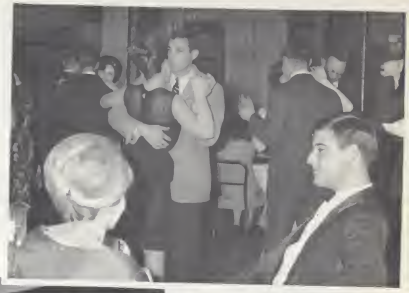
One, two, three, a-leary...

"It had to be you..."



'ey, whassat?

See you at the Ball"



Se magnifiqué.

Look, Ma, no cavities.

What's the matter, buddy? You got a problem?

"Aww, you're kiddin'."

"No, I'm not, really."

TO THOSE WHO WILL NOT GRADUATE IN JUNE

IF YOU WILL BE . . .	YOU ARE ELIGIBLE FOR . . .
A SENIOR NEXT YEAR	TECHNICAL EDITOR EDITORIAL ASSISTANTS ADVERTISING MANAGER
A JUNIOR NEXT YEAR	ASSISTANT EDITOR-IN-CHIEF TECHNICAL EDITOR ASS'TS PHOTOGRAPHERS CIRCULATION MANAGER ASS'TS ADVERTISING MANAGER
A SOPHOMORE NEXT YEAR	CIRCULATION MANAGER ASS'TS ADVERTISING MANAGER ASS'TS PHOTOGRAPHERS

IF YOU WANT TO KNOW MORE —

LEAVE YOUR NAME, ADDRESS, AND PHONE NUMBER IN THE SUGGESTION BOX.

IF YOU KNOW WHICH POSITION YOU WANT —

LEAVE YOUR NAME, ADDRESS, AND PHONE NUMBER IN THE SUGGESTION BOX.

NO EXPERIENCE REQUIRED

except for photographers

MECHELECIV MAGAZINE

Progress in the Bell System...

SWIMS...

ORBITS...

BEAMS...

FLASHES...

PUSHES...

PULSES...

TALKS...

BURROWS...

WINKS...

BLINKS...

AND LIVES AND BREATHES...

Progress takes many shapes in the Bell System. And among the shapers are young men, not unlike yourself, impatient to make things happen for their companies and themselves. There are few places where such restlessness is more welcomed or rewarded than in the fast-growing phone business.

Bell Telephone Companies

What's new at Bethlehem Steel?

On a Pennsylvania mountaintop, new research laboratories . . .

On the Indiana lakefront, we're building a new steel plant

Looking for real opportunity? On the crest of South Mountain, in Bethlehem, Pa., we have recently completed the industry's newest research laboratories, a $40-million investment aimed at making Bethlehem the leader in steel technology. And, at Burns Harbor, Indiana, we're building a new plant at an initial investment of $250 million. It will incorporate the latest advances known to metalworking science.

At Bethlehem Steel we have our sights set on continuous growth and modernization; constant development of new and improved products. This means career opportunities for alert and aggressive college graduates . . . in steel plant operations, sales, research, mining, shipbuilding, fabricated steel construction, and many other activities.

You can get a copy of our booklet, "Careers with Bethlehem Steel and the Loop Course," at your Placement Office, or by sending a postcard to our Personnel Division, Bethlehem, Pa.

BETHLEHEM STEEL

BETHLEHEM STEEL

An equal opportunity employer

Here are 6 reasons why you should spend at least the next four years with us...

You'll find that at least a few of these six advantages are exclusive with the civilian Navy generally, and especially with the world-renowned Naval Ordnance Laboratory because of its perenially powerful role in government weaponry research. No "Blue Sky" promises here—you'll soon see why these advantages make sense individually, and why collectively they represent a career development opportunity you really should consider.

1 Vital assignments of national importance

Whatever programs you may work on . . . missile guidance, weapons systems, re-entry components, underwater ordnance, fire control, sonar, fuzes, sonobuoys, nuclear explosives, propellants, solid state, acoustics, infrared . . . you see and follow the big picture, from initial concept to fleet acceptance. *More than 95 major weapons devices developed at NOL are in fleet use today.*

2 Training programs encourage Breadth of Experience

During your first year you will rotate through four assignments in research, engineering, and evaluation. This enables you to understand the whole and to help select a permanent assignment area.

3 Wholly- or Partly-Paid Graduate Education Programs

Various accredited graduate programs, both with local institutions or the university of your choice, permit you to attain your advanced degrees. Many courses are held right at NOL, and enable young professionals to work full time while participating. Most such programs provide for reimbursement of tuition. Stipends, in some cases, are available.

4 Professional Stature and Future Opportunity

NOL retains patents in the employee's name for professional purposes, and for commercial rights in some instances. Attendance at professional meetings is encouraged, and there is ample opportunity to conduct foundational research. At the end of these four years, many doors to the future will be open to you . . . as a professional engineer with an unusually strong R & D background.

5 Top-Flight Equipment & Facilities

Because so much in-house work —$30 MILLION annually—goes beyond the existing and known, NOL has many of the finest research and development facilities available anywhere. NOL headquarters spread over nearly 1,000 acres of suburban Maryland just outside Washington, D. C. (now one of the nation's leading R & D centers). You may also work at NOL test facilities elsewhere in Maryland, in Virginia, and Florida . . . as well as with the operating units of the fleet.

6 Reach the $10,000 to $12,000 level within 4 years

New and virtually unknown is the fact that the new government salary structure lets you earn more than $10,000 within four years . . . PLUS all the benefits of Career Civil Service.

Watch for the NOL representative on campus

If you would like to contact NOL directly, write to Mr. Emil Kranda, Personnel Officer.

NAVAL ORDNANCE LABORATORY

NOL WHITE OAK

SILVER SPRING, MARYLAND

An Equal Opportunity Employer

TAU BETA PI NANCY SMITH

SIGMA TAU LOIS BARDER

ASME PRISCILLA BLOOM

ASCE DIANE EDWARDS

MECHELECIV LAURA COL

IEEE VIRGINIA KAY ADAMS

1964

Engineers' Queen

Miss Kathleen Burneston

Sponsored by Theta Tau

POWER POLITICS/ENGINEERS

NOTE TO THE READER:

This is the Tau Beta Pi Pledge essay that placed first in the Spring, 1963, pledge class contest.

Robert Pulfrey

(The people in our time are afraid. The Capitalists are afraid of the Communists are afraid of the Socialists are afraid of the Facists are afraid of labor are afraid of management are afraid of students are afraid of too much freedom, not enough freedom, living, dying, standing, sitting, eating, not eating, money, poverty, love, hate, knowledge, ignorance, their shadows.)

Let us suppose for a moment that within his professional ken the engineer holds a key to the development of the ultimate terror weapon: a device that can destroy the earth. Where does this place him as an instrument in the global power struggle that we are now seeing; how can this be resolved with his pledge to utilize the forces of nature for the benefit of mankind; what does he do with this awesome power and responsibility, once developed; and, as a human being, can he rationalize any use or misuse of this power so long as it is by others?

Since the beginning of war, there has been an ever-increasing tendency toward more and more mechanization, i.e., the removal of the combatants from direct contact. The enemy is no longer hit on the head with a club; he is shot down at long distances with the press of a finger on a rifle trigger. No longer is his house set afire by torch; it is incinerated under a barrage of missiles from thousands of miles away.

On the surface it might appear that the removal of combatants would make the battle "safer", but upon reconsideration, it is clear that, in fact, it is much more dangerous. There was the time, even in this century, when a few hundred or thousand killed was a horrible battle; but now, our sense of values has been raised to the point where, if whole nations are not wiped out, millions or even hundreds of millions killed, maimed, irradiated, then the battle was a very unrewarding one and hardly worth the trouble. The point is that mechanized war is much more efficient. It's not only unnecessary to bring the combatants together, but we can kill more if we don't. A man doesn't have to take the trouble to be on the battlefield, because we can do as good a job roasting him in his bedroom -- maybe better.

So, where is the engineer in all of this? Is it his fault? The weapons were designed by engineers, of one sort or another, looking for a better way to do a job. Are we headed inexorably toward disaster from our own genius? Or is there a way out?

The crucial point about mechanization of war is the fact that the combatants are not in a position to view directly the consequences of their actions or to feel the responsibility for them. It is too easy to pull a trigger, throw a lever, or push a button and forget the carnage it causes. What is worse is that it's even easier to give someone else the order to push the button. We can say that we try to keep the consequences in mind and that we feel some reluctance about the whole matter; but, simply stated, carrying out operations which are indirectly related to destruction is intrinsically easier for us to rationalize than destruction itself. There is nothing naturally appalling or hard to rationalize about pushing a button. When this level of abstraction reaches a certain degree, it is not considered necessary to rationalize and this is where people -- engineers, scientists -- who have indirect involvement enter the picture.

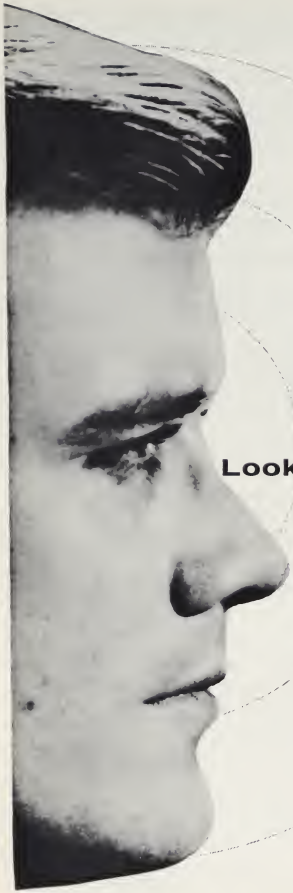
Although these people do not have a direct involvement in the situation, they do have an insight which others cannot have. The designers of weapons systems know the facts about these systems, and their implications, to a far greater degree than politicians or other persons, concerned, persons who can be made to understand only with great difficulty, if at all.

The tendency in a human relations problem, if the problem is difficult, is to ignore it if at all possible. Communications between the scientific and lay community are, at best, difficult, and misunderstandings and misconceptions are bound to occur. Furthermore, the technical community often is in disagreement itself, compounding the confusion.

These problems notwithstanding, a much greater effort on the part of technical people everywhere could be made to spread knowledge of their work, and especially of the implications of it. Engineers must accept responsibility to help eliminate power politics as an instrument of diplomacy. The only way in which the power of weapons developed can be rationalized as being for the good of mankind is if that power is, in fact, turned to peaceful alternatives.

We cannot expect to accomplish this immediately, considering the situation realistically, but the time is past when engineers could harness the forces of nature and turn this power over to anyone for any purpose. A technocracy is clearly not the solution, because technicians do not, in general, have anything like the special political insights necessary to run a society. Yet, now that we control nature, we must more than ever concentrate our technical efforts toward the control of mankind.

INDEX TO ADVERTISERS



First, what is the obvious? It's obvious that you're in demand. You don't have to worry about getting your material wants satisfied. And you don't have to worry about getting opportunities for professional growth.

But, if you look beyond the obvious, you'll realize now that you're going to want something more than material rewards from your career. You're going to want **pride**—pride in your personal, individual contribution.

Melpar is a proud Company. We're proud of our approach to the solution of problems; we're proud of our growth pattern; and we're proud of the communities that surround our laboratories and plants in Northern Virginia.

But most of all, we're proud of our contributions in the areas of basic and applied research, design, development and production in the areas of Advanced Electronics, Aerospace Systems, and the Physical and Life Sciences. Our projects have ranged from tiny microcircuits to computers the size of a basketball court. From synthesis of an insect's nervous system to a study of cometary tails. From production of thousands of high reliability circuit boards for the Minuteman Program to construction of a transmitting antenna atop the Empire State Building.

Look beyond the obvious . . .

Melpar's broad activities have created requirements for engineers and scientists with degrees in Electrical Engineering, Mechanical Engineering, Physics, Chemistry, Mathematics, and the Biological Sciences.

If you want an opportunity to be proud of your contribution and your Company, we're interested in hearing from you. Tell us about yourself. Either ask your Placement Director for more information, or write to our Professional Employment Supervisor. Tell him if you would like to hear from one of your college's graduates who is now progressing at Melpar.

MELPAR INC

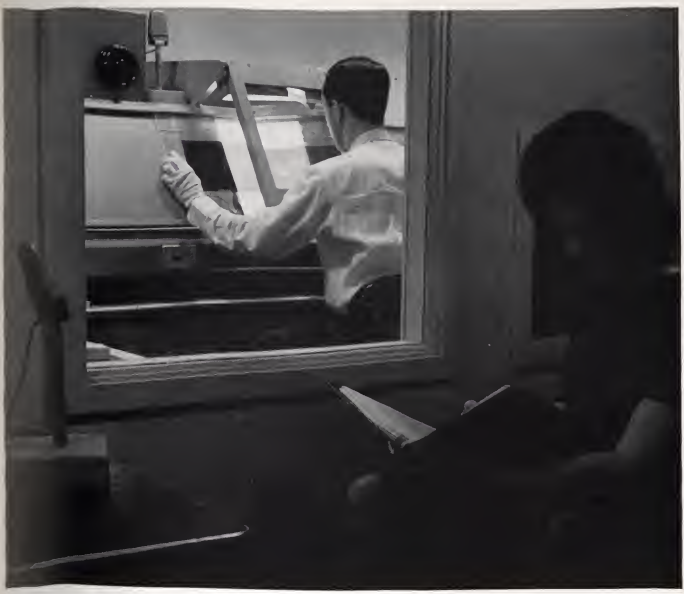
A SUBSIDIARY OF WESTINGHOUSE AIR BRAKE COMPANY

3451 Arlington Boulevard, Falls Church, Virginia

In Historic Fairfax County

(10 miles from Washington, D. C.)

An Equal-Opportunity Employer



WE MAKE INDUSTRIAL ENGINEERS SWEAT

Might as well scare off the ones who wouldn't like it. Some of the unscared will in a few years be referred to as "they" when people say, "At Eastman Kodak, *they* can afford to do it this way—"

The reason we can afford to do things the best way is that we are successful. The success can be attributed in part to a fear worth fearing: of failing to deliver the best possible performance that the customer's hard-won dollar can buy.

Sheer devotion on the part of the work force, though beautiful to see, will not of itself deliver the goods. Somebody must first come up with a sensible answer to the question, "Exactly what is it you want me to do, mister?"

Thus a young industrial engineer may find himself acting as his own first subject in a study he has set up to find the physical and psychological conditions that best favor alertness against film emulsion defects. If he saw the need, sold his boss on his approach, and has earned the approbation alike of the pretty psychologist who will be running the experiment, the industrial physicians (who study what is humanly possible, feasible, and healthful muscularly and perceptually), the cold-eyed man from the comptroller's office, the Testing Division chief (who has dedicated his division to the descent of an asymptote), and the inspectors (who will find a month after switching to the new method that at home they are shouting at their kids less often)—then we know ways to make him glad he chose to learn the profession of industrial engineering at the company which the leaders of the profession often cite as its ideal home.

Naturally, industrial engineers aren't the only technical people we seek. Not by a long shot.

EASTMAN KODAK COMPANY,
Business and Technical Personnel Department, Rochester, N. Y. 14650
An equal-opportunity employer offering a choice of three communities:
Rochester, N. Y., Kingsport, Tenn., and Longview, Tex.

Kodak

Define Your Career Objectives!

■ An interview with W. Scott Hill, Manager—Engineering Recruiting, General Electric Co.

W. Scott Hill

Q. Mr. Hill, when is the best time to begin making decisions on my career objectives?

A. When you selected a technical discipline, you made one of your important career decisions. This defined the general area in which you will probably begin your professional work, whether in a job or through further study at the graduate level.

Q. Can you suggest some factors that might influence my career choice?

A. By the time you have reached your senior year in college, you know certain things about yourself that are going to be important. If you have a strong technical orientation and like problem solving, there are many good engineering career choices in all functions of industry: design and development; manufacturing and technical marketing. If you enjoy exploring theoretical concepts, perhaps research—on one of the many levels to be found in industry—is a career choice to consider. And don't think any one area offers a great deal more opportunity for your talent than another. They all need top creative engineering skill and the ability to deal successfully with people.

Q. After I've evaluated my own abilities, how do I judge realistically what I can do with them?

A. I'm sure you're already getting all the information you can on career fields related to your discipline. Don't overlook your family, friends and acquaintances, especially recent graduates, as sources of information. Have you made full use of your faculty and placement office for advice? Information is available in the technical journals and society publications. Read them to see what firms are contributing to advancement in your field, and how. Review the files in your placement office for company literature. This can tell you a great deal about openings and programs, career areas and company organization.

Q. Can you suggest what criteria I can apply in relating this information to my own career prospects?

A. In appraising opportunities, apply criteria important to you. Is location important? What level of income would you like to attain? What is the scope of opportunity of the firm you'll select? Should you trade off starting salary against long-term potential? These are things you must decide for yourself.

Q. Can companies like General Electric assure me of a correct career choice?

A. It costs industry a great deal of money to hire a young engineer and start him on a career path. So, very selfishly, we'll be doing everything possible to be sure at the beginning that the choice is right for you. But a bad mistake can cost you even more in lost time and income. General Electric's concept of Personalized Career Planning is to recognize that your decisions will be largely determined by your individual abilities, inclinations, and ambitions. This Company's unusual diversity offers you great flexibility in deciding where you want to start, how you want to start and what you want to accomplish. You will be encouraged to develop to the fullest extent of your capability—to achieve your career objectives, or revise them as your abilities are more fully revealed to you. Make sure you set your goals realistically. But be sure you don't set your sights too low.

FOR MORE INFORMATION on G.E.'s concept of Personalized Career Planning, and for material that will help you define your opportunity at General Electric, write Mr. Hill at this address: General Electric Co., Section 699-10, Schenectady, N. Y. 12305.

GENERAL ELECTRIC

An Equal Opportunity Employer